

## CLAIMS

1) A method for forming iteratively a model representative of the permeability field of a heterogeneous medium, discretized by a grid pattern, such as an underground zone, constrained by a priori geologic data and dynamic data collected in the medium by measurements and observations obtained beforehand, characterized in that it includes :

- a first stage comprising :

a) generating an initial model of the permeability in accordance with a Gaussian or related stochastic model, coherent with the a priori geologic data, and carrying out, by means of a suitable simulator, a simulation of the fluid flows,

b) identifying zones inside the reservoir, calculating the effective permeabilities of these zones and, from the simulator results, estimating the corrections to be brought to these effective permeabilities to improve calibration in relation to said data, and

- a second stage comprising : c) propagating said corrections to the whole of the grid cells of the permeability field, by means of an iterative optimization process comprising minimizing a functional which quantifies the difference between the effective permeabilities required to obtain said calibration and the effective permeabilities calculated for the permeability field considered, using a technique of gradual deformation of realizations of the stochastic model.

2) A method as claimed in claim 1, characterized in that the zones are defined either manually or automatically from the flow simulator.

3) A method as claimed in claim 1, characterized in that flow simulation is carried out by means of a streamline simulator and the zones of said medium are identified by a set of grid cells traversed by one or more streamlines of fixed geometry.

4) A method as claimed in claim 1, characterized in that said zones are identified as  
5 volume portions on the periphery of wells running through said medium, within the framework of well tests.

5) A method as claimed in any one of the previous claims, characterized in that at least one gradual deformation parameter is assigned to each one of said zones.